



The Connecticut Agricultural Experiment Station.

NEW HAVEN, CONN.

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The object of this Bulletin is to call attention to the Collection of Grasses and Forage Plants which have been growing during the past summer in the Station Garden and also to invite exchanges of grasses,—plants or seeds,—from Experiment Stations, Agricultural Colleges, farmers, graziers, gardeners, and any others who may be interested in the same subject and desire to co-operate.

It is designed that the Forage-garden of this Station shall contain specimens of all the grasses which are found in Connecticut. There are in the state about one hundred and twenty species; of these we have now growing in the Garden eighty-one. Prominence is given to persistent meadow, pasture and lawn grasses, and to those which we continually reproduce by culture and seeding. Some varieties of each of the grasses whose seeds are used for food, viz. wheat, rye, oats, barley, maize, etc., are to be found in the garden as well as a number of grasses that are often called weeds. There will also be found some thirty species of grasses which do not grow without cultivation in Connecticut. Besides grasses, there are grown in this garden clovers, vetches and lupines, as well as some of the more interesting sedges, which still furnish a large part of our hay and grazing. All these kinds of plants are proper subjects of recognition and study, whether they prove useful or not.

As each species is correctly labeled, this garden illustrates the botany of Forage Plants, showing, as the season advances, the characteristic foliage, flowers and seed of all the grasses and plants therein; and so provides a means by which persons without special botanical knowledge can identify the grasses found in Connecticut.

We have reason to hope that there will be a demand in this state for small collections of useful (and perhaps injurious) plants for exhibition at agricultural and industrial fairs and for study by granges, farmers' clubs, and common schools. The Station will shortly be able to supply such collections. This would be the surest and easiest way to diffuse throughout the state a more exact knowledge of our meadow and pasture grasses.

The Forage-garden is a place for saving small quantities of pure seed; and for testing by examination, sprouting, or actual growth—for a term of years if need be—the value of seeds found in the market, also of commercial mixtures of seed for meadows, pastures, lawns, etc.

This Garden also furnishes means for studying many questions in regard to the habits of grasses and other forage plants which are of importance to the agriculture of this state. We may determine how each grass stands our climate and soil; what are its rooting and seeding peculiarities; natural manner of spreading; growth in company with various other kinds; what improvements are possible by selection of seed; the effect of different fertilizers, etc.

Further remarks on the Garden will appear in our annual Report. This preliminary notice is made because the best time—except in early Spring—for making exchanges of seeds, sods or plants, is now, in the Fall. In the autumn sowing of seeds there is risk but time may be gained by skillful management.

Sods of surface-rooting varieties may be cut two inches deep—others deeper—and if packed tightly in boxes or barrels, may be shipped long distances in cool weather without injury. We received from Wyoming last Spring sods which were a week on the road, and yet they made excellent growth in the Garden. Sods planted late, like very young seedlings, will require protection in the Winter.

The Station will be glad to receive from any source seeds or sods of grasses not in the following list, and to exchange for them any sod or seed which it has in surplus. To the extent of its

ability it will aid any institution which has such work in prospect. It will also continue to receive from citizens of Connecticut plants for identification as explained in Bulletin No. 91.

ON THE CLASSIFICATION AND NAMING OF PLANTS.

To aid in understanding the plan by which men of science have classified and named grasses and other plants, the following explanations are offered.

It is evident at the outset that in order to describe a plant exactly words must be used which have as far as possible a strictly definite and unmistakable meaning. Botanists acting on this principle have adopted certain words which they employ in their descriptions of plants. Such words are *variety*, *species*, *genus*, and *family*. In the following pages we have endeavored to give the sense in which the botanist uses some of the more important of these terms believing that the farmer also will find great benefit in their scientific use.

A *Species* is intended to include all individual plants which are very closely alike in form, structure and manner of growth, and which steadily reproduce plants which are like the parents in all these particulars. For instance there is a species called the white oak (*Quercus alba*). The leaves of every white oak tree are lyre-shaped, with wavy outlines, having no pointed tips, of a bright green color above and pale below. All white oaks bear their acorns in the fall, on wood of the same year's growth, the cups of these acorns are rough and the acorns themselves are oblong. No other oak but the white oak has all these peculiarities of structure and growth. The white oak cannot be confounded, by any one who knows these facts, with the red oak, or the scrub oak, or the swamp white oak which are three distinct species. Moreover from the acorns of the white oak only a white oak will grow, never a swamp white oak, scrub oak or red oak. The white oaks are related by a kind of common origin which the other oaks do not have in common with them. Another distinguishing mark of a species is the power of continued reproduction between individuals belonging to it. All white oaks cross-fertilize, i. e., the pollen from one white oak tree will fertilize the pistillate flower of any other white oak tree, whereas it would not fertilize the pistillate flower of another perfectly distinct species of oak.

Among grasses, wheat (*Agropyrum vulgare*) is a species and Quack (*Agropyrum repens*) is another. The specific differences between the two are known to all farmers as well as the fact that wheat and quack never "cross."

Varieties.—Individuals of the same species while very closely alike differ from each other more or less. Circumstances of soil, climate, etc., increase these differences and varieties originate when such differences assume a *comparative permanence and fixity*. But as external conditions cause variations away from any particular representative of a species, so they may cause variation back again to the original, and although variation may take a seemingly wide range, its bounds are fixed and do not touch specific characters. Among plants varieties may often be perpetuated by the seed. This is true of our cereals and leguminous crops, which reproduce their kind with striking regularity. The Tom Thumb, Marrowfat and Champion of England peas, for instance, are all varieties of one species which are reproduced true to the seed. In case of other plants such as potatoes, apples, etc., favorite varieties cannot be, or are not, certainly reproduced unalterably by the seed.

The white oak has no varieties with us but of the Chestnut Oak there are the Rock Chestnut Oak, the Yellow Chestnut Oak and the Dwarf Chestnut or Chinquapin Oak; these are all varieties having some distinctive characters, but in general nearly alike and by botanists are considered to form one species.

Red-top [*Agrostis vulgaris*] has two agricultural varieties as distinct as the Tom Thumb and the Champion of England Pea: Tall Red-top which grows 24–30 inches high, blooms a week later than the other variety and has a coarser foliage; Fine Red-top or, Rhode Island Bent, which grows 12–15 inches high, blooms earlier and has a much finer foliage. Both are reproduced true from seed. We also find forms intermediate between these two which evidently belong to the same species although they cannot always be classed with one variety rather than the other.

Genus.—All the different species of oaks have a general family resemblance noticeable by any one, and certain common characters, chiefly in their flower and fruit, which distinguish them from all other trees. This group of closely allied species makes a *genus* [plural, *genera*]. So we have the oak genus [*Quercus*] including the white oak, the chestnut oak, red oak, etc. In like manner we have the Red-top genus [*Agrostis*], which includes

our common varieties of Red-top, already spoken of, besides fiorin [*Agrostis alba*], about which English grass books say so much, Brown Bent or Dog's Bent [*Agrostis canina*], and the Thin grass [*Agrostis perennans*], which grows in shady places, etc. The Timothy genus [*Phleum*] includes both our eastern Timothy [*Phleum pratense*], or English grass and the Mountain Timothy of the west [*Phleum alpinum*].

Families.—The genera themselves are grouped into families. Thus the oaks, chestnuts, beeches, hazels and hornbeams, all belong in one family, the *Cupuliferæ* or cup bearers, so called because each fruit, a nut, is borne in a cup-shaped receptacle. So too the genera *Agrostis* and *Phleum*, and all other grasses belong in the one family of *Gramineæ*, whose aspect and characters are well known.

NAMES OF GRASSES.

It is evident that in order to speak or write intelligibly of plants it is necessary to have a name for each which shall be understood perfectly and every where, and which shall apply to one species and only one. Following the method first proposed by Linnæus, "the father of botany," it was long ago agreed to give to each species of plants two names, one, the first, being the name of its genus, the second the species name; and in order that the same name might be used by botanists of all lands the Latin form was used, that being the nearest approach to a universal language. The name is given by the botanist who first identifies or classifies the plant and his name or initials are often put after the name which he gives. *Quercus*, as we have already seen, is the name of the oak genus, as distinguished from the hickory or chestnut genus, *alba* is the species or specific name and distinguishes the white oak from the red oak, live oak, post oak, etc. While the name white oak is recognized only where the English language is spoken and even there is liable to be confounded with the swamp white oak, which is a very distinct species, the name *Quercus alba* is understood by botanists all over the world. But it sometimes happens that after a plant supposed to be new has been named, it appears that it has been previously described and differently named by some one else. In such cases, to avoid all confusion, the invariable rule is to use the name first given.

These then are the names found in our botanical books. The objection to their common use is that they are in a strange lan-

guage and sometimes long. They are hardly stranger, however, than "nitrogen," "available phosphoric acid," and "actual potash" were to most farmers a few years ago. The advantage of these names is that they avoid all confusion and make intelligible our discussion of botanical matters. To illustrate: "Poverty grass" is a common grass, frequently spoken of among farmers, but it is a name applied commonly to at least two very distinct species, viz: *Danthonia spicata*, which grows only in a very poor soil and is of no value as forage, and *Andropogon scoparius*, which also grows on poor sandy soil, but in some places makes valuable feed. This last is also called "broom sedge," whereas it is not at all a sedge. "Blue Stem" and "Blue Bent" are names of one of our very best native grasses, *Andropogon provincialis*; "Blue Joint" is the name of a grass very different and inferior to the last, viz: *Deyeuxia Canadensis*. "Wood grass" is applied to *Chrysopogon nutans*, a coarse but good forage grass, and to *Muhlenbergia Mexicana*, which is totally different in appearance and value. Now "Poverty grass," "Blue Stem," "Blue Bent" and "Wood grass," are indefinite terms, but *Danthonia spicata*, *Andropogon provincialis*, *Muhlenbergia Mexicana*, etc., can never be confused, since these names are used by all botanists and in their writings all the peculiarities of these grasses are accurately and fully described. In the list of names of grasses on page 9 of this Bulletin will be found both the botanical and colloquial names of the commonest grasses, which will illustrate these points and will also explain the meaning of some botanical names.

We believe that a better knowledge of our Connecticut grasses, of their habits of growth and forage value, is one great need of our agriculture. But the first step towards getting and spreading that knowledge must be to have names for our common grasses which shall be so definite that no one will misunderstand them, and which shall not be so difficult or uncouth that intelligent men will not use them. At present we have no such names *in common use* among us. There are not more than four or five grasses in this state whose common English names are generally used throughout the state without confusing synonyms which are also applied to other grasses. These are Timothy, Red-top, June-grass, Orchard-grass and Sweet Vernal-grass. Even Red-top applies to two grasses agriculturally distinct, and June-grass is a name quite generally used without the knowledge that it

is the same as Kentucky Blue-grass. Yet there are at least eleven important meadow grasses which are mowed in large quantity every year in the state, and at least six others which are common and valuable pasture grasses, to say nothing of a number of less common but very useful ones and of the sedges, some of which are valuable. We have then on the one hand Latin botanical names which are tolerably free from confusion and on the other hand common English names which are very much confused and indefinite. The former are not familiar and are, perhaps, harder to learn than the latter. The question is, can they and will they be learned by intelligent farmers? If not, can English names be agreed upon for all our common grasses which shall be as definite and free from confusion as the botanical names, and can they be brought into common use? A revision of the grass nomenclature now in common use, like the revision of pomological names which is at present going on, is very desirable. Till it is accomplished, the Station, to be accurate and clear, can only use the botanical names, supplying where possible the best common names, as on p. 9 of this Bulletin.

The following list includes all grasses which have grown in the Station Forage-garden during the present season. The annual grasses of course, at this time, are dead, and have been sown again for next year. An asterisk (*) before the name of a grass denotes that we have at our disposal, for exchange, a few young plants or sods; a dagger (†) in the same position denotes that we have seed for exchange. The quantity which we propose to exchange will be quite small, in most cases only sufficient for a drill seven or eight feet long; enough, however, to show the characters of the grass, and to yield seed next year for a larger sowing, if that is desired. The seed we believe to be sound, strictly pure and true to name, most of it gathered in this garden and by our own hands.

GRASSES IN THE GARDEN OF THE STATION.

Agropyrum caninum. [<i>Triticum caninum</i> of Gray's botany.]	†Cenchrus tribuloides.
divergens.	†Chrysopogon nutans, [<i>Sorghum nutans</i> of Gray's botany.]
†glaucum.	†Cinna arundinacea.
†repens. [<i>Triticum repens</i> of Gray's botany.]	Cynosurus cristatus.
†tenerum.	[<i>Cyperus Michauxianus</i> .]
Agrostis exarata.	*†Dactylis glomerata.
*†perennans.	*†Danthonia spicata.
†scabra.	Deschampsia caespitosa.
*†vulgaris, var. major.	†flexuosa.
*†vulgaris, var. minor.	†pulchella?
*†var. alba?	†Deyeuxia Canadensis.
*†Alopecurus pratensis.	[<i>Calamagrostis Canadensis</i> of Gray's botany.]
†Andropogon dissitiflorus.	Diplachne fascicularis, [<i>Leptochloa fascicularis</i> of Gray's botany.]
[<i>A. Virginicus</i> of Gray's botany.]	Eatonia obtusata.
†provincialis, [<i>A. furcatus</i> of Gray's botany.]	Eleusine Indica.
*†scoparius.	Elymus Canadensis.
†Anthoxanthum odoratum.	*†Virginicus.
†var. Puelii.	†Eragrostis capillaris.
†Apera spica-venti.	*†pectinacea.
†Aristida purpurascens.	†pilosa.
purpurea.	†poeoides, var. megastachya.
*†Arrhenatherum avenaceum.	Erianthus Ravennae.
*†Asprella hystrix. [<i>Gymnostichum hystrix</i> , of Gray's botany.]	Eulalia Japonica.
*†Avena flavescens.	var. variegata.
†Boutiloua olygostachya.	*Festuca duriuscula.
*†Bromus brizaeformis.	†elatior.
†ciliatus.	heterophylla.
*inermis.	nutans.
*pratensis.	*ovina.
*†Schraederi.	var. tenuifolia.
*†secalinus.	var. rubra.
†segetum.	†tenella.
*†tectorum.	†Glyceria aquatica. var. Americana.
[<i>Carex stricta</i> .]	†Canadensis.
[tentaculata.]	nervata.
*[vulgaris.]	†Holcus lanatus.
	Hordeum jubatum.
	Leersia oryzoides.
	Virginicus.

*† <i>Lolium perenne</i> .	<i>Phragmites communis</i> .
*† var. <i>Italicum</i> .	<i>Poa annua</i> .
* var. <i>tenue</i> .	* <i>arachnifera</i> .
<i>Muhlenbergia capillaris</i> .	*† <i>compressa</i> .
† <i>diffusa</i> .	<i>Nevadensis</i> .
*† <i>Mexicana</i> .	* <i>pratensis</i> .
<i>Willdenovii</i> .	*† <i>serotina</i> .
† <i>Panicum agrostoides</i> .	<i>trivialis</i> .
† <i>capillare</i> .	<i>Reana luxurians</i> .
<i>clandestinum</i> .	† <i>Setaria glauca</i> .
† <i>crus-galli</i> .	† <i>verticillata</i> .
† var. <i>hispidum</i> .	† <i>viridis</i> .
<i>dichotomum</i> .	<i>Sorghum halapense</i> .
<i>filiforme</i> .	<i>Spartina cynosuroides</i> .
<i>glabrum</i> .	<i>Sporobolus depauperatus</i> .
† <i>latifolium</i> .	† <i>heterolepis</i> .
† <i>miliaceum</i> .	<i>Stipa pennata</i> .
<i>proliferum</i> .	<i>spartea</i> .
† <i>sanguinale</i> .	*† <i>Triodia seslerioides</i> . [<i>Tricuspis</i>
† <i>virgatum</i> .	<i>seslerioides</i> , of Gray's botany.]
<i>Paspalum setaceum</i> .	* <i>Vilfa vaginaeflora</i> .
* <i>Phalaris arundinacea</i> .	<i>aspera</i> .
*† <i>Phleum pratense</i> .	

Since these botanical names are not familiar to many, there follow here by way of explanation, the botanical names of the more common agricultural grasses, their pronunciation indicated by accents, and their derivation given as far as that is possible. With each are given, in lighter type, the colloquial or provincial names by which they are commonly known.

BOTANICAL AND COLLOQUIAL NAMES OF GRASSES.

Agropyrum répens, formerly called *Triticum repens*, [*Agropyrus* = field wheat, *repens* = creeping.] Couch-, Quitch-, or Quick-grass, Quack, Twitch- or Dog's-grass, Dutch-grass, Durfa, Devil's-grass. Grows through potato tubers!

Agróstis scábra, [*scabra* = rough.] Hair-grass. Its extremely fine radical leaves (like *Festuca ovina*) suggests its possible use in lawns. Color dark green.

Agróstis vulgáris. [*Agrostis* = a field, the place of growth, *vulgaris* = common or ordinary; i. e. common field grass.] Red-top, Fine-top, Furze-top, Burden-grass (from its fleece-like burden rolling from the point of the scythe) Bent, Fine Bent, Rhode Island Bent. These names all apply in different sections to a variety that is twelve to fifteen inches high and blooms a little earlier than another taller variety, which is Tall Red-top. Tall Red-top grows twenty-four to thirty inches high, and is much sown with timothy and clover in short rotation.

The seed of this is now chiefly grown far west. That of the other for lawns should be saved from clean turf in the east as of well-swarded sheep pastures, with no mixture of other grasses.

Alopecúrus praténsis. [*Alopecurus* = a fox tail, *pratensis* = of the meadow.] Meadow Fox tail, "Mountain Timothy" of Montana. Blooms earlier, taller, and with a shorter head than Timothy, moreover the leaves and stems are of a darker and richer green.

Andropógon provincialis. [*Andropogon* = bearded man, the staminate or male flowers often being bearded, *provincialis* = of a province.] Thatch, Finger-spiked Broom-grass, Blue Stem, Blue Bent of Connecticut River meadows.

Andropógon scopárius. [*scoparius*, Latin=sweeping.] Wood-grass. Broom-grass, Broom sedge. The grass of the Wallingford plains.

Andropógon dissitiflorus. Broom sedge. Not a sedge but a grass.

The Andropogons start late in spring and stop growing with cool weather.

Anthoxánthum odorátum. [*Anthoxanthum* = flower of flowers, *odoratum* = odorous.] Sweet Vernal-grass, Sweet-scented Spring-grass. Has bitter foliage.

Arrhenatherum avenaceum. [*Arrhenatherum* = awned stamen, *avenaceum* = like oats.] Tall Oat-grass. The foliage has a distinctly bitter taste.

Chrysopógon nútans. [*Chrysopogon* = golden bearded, *nutans* = nodding.] *Sorghum nutans*. Indian-grass, Wood-grass. Starts late in spring and stops growing with cool weather.

Cinna arundinácea. [*Cinna*, name unexplained, *arundinacea* = reed-like.] Wood Reed-grass.

Dáctylis glomeráta. [*Dactylis* = finger's breadth, alluding to the size of the clusters, *glomerata* = crowded together, in allusion to the flower clusters.] Orchard-grass, Cock's-foot-grass, Rough Cock's-foot-grass. Young stems flat at base in fall and spring, and so quite distinct from Timothy.

Danthónia spicáta. [*Danthonia*, from Danthoine, a French botanist, *spicata* = spiked.] Poverty-grass. Oat-grass. Spiked wild Oat-grass. White Top.

Deyeúxia Canadénsis. Blue Joint, Small Reed-grass. Grows in wet places.

Festúca ovína. [*Festuca*, the old Latin name for it, *ovina* = belonging to sheep.] Sheep's Fescue. Makes the finest, close sward alone and without manure on suitable soils. Seed in market seems to grow plants which are seedy and bunchy. Remedy may be a return to old pasture seed.

Festúca elátior. [*elatior* = taller.] Taller or Meadow Fescue, Randall-grass, Evergreen-grass.

Glycéria Canadénsis. [*Glyceria* = sweet, in allusion to taste of the grain, *Canadensis* = Canadian.] Rattlesnake-grass, Tall Quaking-grass. Grows in wet places.

Glycéria nerváta. [*nervata* = nerved.] Nerved Meadow-grass, Nerved Manna-grass, Fowl Meadow-grass. This name is properly applied only to *Poa serotina*. Makes good hay on wet land.

Glycéria aquática. [*aquatica* = aquatic.] Reed Meadow-grass, White Spear-grass. A wet meadow grass.

Hólcus lanátus. [*Holcus* = attractive, *lanatus* = wooly.] Velvet-grass, Meadow Soft-grass, Velvet Mesquite-grass. Called "Calf-Kill" in Rhode Island from the rather dry and wooly, innutritious character of the forage, probably.

Leérsia oryzoídes. [*Leersia*, named for Leers, a German botanist, *oryzoides* = like rice.] Rice Cut-grass. Grows in wet places and in rich flowed land gives very heavy crops. Fodder value not yet well known.

Muhlenbérkia Mexicána. [*Muhlenbergia*, named for Muhlenberg, an American botanist, *Mexicana* = Mexican.] Drop seed. Wood-grass.

Muhlenbérkia diffúsa. [*diffusa* = spreading, diffuse.] Drop-seed. Nimble Will.

Pánicum sanguinále. [*Panicum*, an ancient Latin name for millet supposed to come from the word meaning bread, *sanguinale* = bloody.] Common Crab or Finger-grass. A very common weed under the lawn-mower.

Pánicum agrostóides. [*Agrostoides* = like an *agrostis*.] Red-top Panic.

Pánicum virgátum. [*virgatum* = made of twigs or osiers.] Tall Panic-grass, Switch-grass, Long-panicled Panic-grass, Black Bent of Connecticut River meadows.

These Panicums like the Andropogons are warm weather grasses.

Phléum praténse. [*Phleum*, an ancient Greek name, *pratense* = of the meadow.] Timothy, Herd's grass in New England and New York.

Póa ánnua. [*Poa*, ancient name for grass or fodder, *annua* = annual.] Low Spear-grass, Annual Spear-grass, Annual Meadow-grass, Goose-grass. Good for rich lawns.

Póa compréssa. [*compressa* = pressed together, flat.] Old English Blue-grass, Wire-grass, Flat-stalked Meadow-grass. Will grow in very dry places, sterile railway banks, etc.

Póa serótina. [*serotina* = late ripe or backward.] Fowl Meadow-grass, Late Flowering Meadow-grass, False Red-top.

Póa praténsis. [*pratensis* = of the meadow.] Green or common Meadow-grass, June-grass, Kentucky Blue-grass, Spear-grass. Smooth-stalked Meadow-grass. Excellent for parks and cemeteries. Seed-stalk frequently blasted early in the season. Very common all over Connecticut.

Póa triviális. [*trivialis* = common-place.] Rough-stalked Meadow-grass, Common Meadow-grass. It is scarce and uncommon in meadows except they are old, rich and moist or shaded. Loudon says this, with *P. annua*, are almost the only grasses that will grow in shaded and enclosed places in towns. *Festuca ovina* may have been in Loudon's mind when he wrote "almost."

Zizánia aquática. [*Zizanon* was the Greek name of some wild grain, *aquatica* = aquatic.] Wild Rice, Canada Rice, Indian Rice, Water Oats. Annually reproduces itself, six to ten feet in height, from under water in spring. Blades broad and green as small corn. Seed must be watched for as it falls daily in ripening.

CORRECTION.

On page 21 of Bulletin No. 92 the retail price of Bradley's Complete Top Dressing is given as \$48. This price was quoted to our agent who sampled the goods. We have since learned both from the manufacturer and the dealer that the retail cash price is not over \$42 per ton. The percentage difference will therefore be 20.0 instead of 37.1 as given in the Bulletin.

